Special Lecture

the Semi-Olympus I - the Pen Series

Our mission is to create cameras that combine the ability to take great photographs with compactness, ease of use and affordability.
As we move toward this ideal, we encounter obstacles.
One of those obstacles is the technology barrier, which relates to materials, mechanisms and other aspects. The other is the barrier of accepted wisdom, to which there are no exceptions. Only by breaking through these two barriers can we turn our innovative ideas and dreams into reality.
The designer of the Olympus Pen half-size camera, one of the most successful cameras of all time, talks about his approach and attitudes, from his philosophy of development to the creation of new products.

From a seminar presented at the JCII Camera Museum on Saturday, October 29, 2005
The Olympus Story — From the Semi-Olympus I to the Pen and Pen F Series
(Planning and editing: Olympus Web Strategy Group)

Olympus Pen

Profile of Yoshihisa Maitani

Yoshihisa Maitani was born in 1933. Since boyhood, he felt an affinity toward cameras and photography. After studying mechanical engineering at university, he joined Olympus Optical Co., Ltd. (now Olympus Corporation) in 1956. As a camera designer, he was involved in the development of many cameras that triggered major booms and became milestones in world camera history, including the Olympus Pen (1959), the Olympus Pen F (1963), the Olympus OM-1 (1973) and the Olympus XA (1979). He dies at the age of 76.

Olympus has a tradition of lens technology dating back to its beginnings as a microscope manufacturer.

Thank you for coming here today. The JCII Camera Museum is currently staging an Olympus exhibition, and I thank everyone concerned and acknowledge the considerable effort that has gone into preparing for this exhibition.

One of the things that I've noticed looking at the Museum's exhibits about different manufacturers is that each manufacturer has its own color. I'm sure that Olympus also has its color, too. Yet even though I was involved in designing Olympus cameras, no-one instructed or ordered me to use a particular color. The color just seemed to emerge from somewhere. Perhaps my color became the color of Olympus, but I believe that there is an Olympus color.

My involvement in camera design lasted around 20 years, from the Olympus Pen in 1959 to the XA Series in 1979. The theme for this program is the history of Olympus, and today I'd like to speak about the period from the early beginnings of Olympus cameras until the development of the Pen F as the last product in the Pen Series. In the next session I'll cover the period between the OM Series and the XA Series.

Olympus began to manufacture microscopes in the 1920s under the name Takachiho Seisakusho. I wasn't around in the 1920s, but I've heard that the founder of Olympus had made a fortune trading sugar and decided to use that money to start up a microscope manufacturing business in Japan. I'm told that he faced a difficult struggle, since at that time Japan had no tradition of microscope manufacturing and lacked the necessary technology. Apparently they began by creating products that looked like microscopes and learned the technology from scientists working at the University of Tokyo.

In 1920, Olympus launched its first microscopes, one of which was actually used by the Emperor. The company then began to consider expansion and diversification. Because of its beginnings as a microscope manufacturer, Olympus had become specialized in the production of lenses and was looking for another lens-based product. What they chose was cameras. As with microscopes, they started to develop a camera by first designing the lens. I have the greatest admiration for these pioneers, for the lens is the soul of the camera.

The first Olympus microscope — The Asahi

Your dreams and philosophy determine the products you choose to make.

In the late 1920s they also began to develop shutters. However, you can't make a camera from just a lens and a shutter. Olympus was a microscope manufacturer, and so they needed someone who knew about cameras. Again they turned to the University of Tokyo Research Institute for assistance and were introduced to Eiichi Sakurai. Then a student at the university, Sakurai had a keen interest in photography. After recruiting him, the company was at last ready to start designing cameras.

Eiichi Sakurai joined Olympus in 1935, and this marked the beginning of Olympus cameras. His profound understanding of cameras allowed Olympus to bring a variety of new products to the market. Manufacturing is a complex business: you need to invest around a billion yen in facilities and equipment just to make one simple camera. For a camera like the OM, the cost is almost 10 billion yen, so there are always debates and problems.

I was eventually able to get my own way and develop the OM SLR camera. We also created compact SLR cameras, which sold worldwide. You might think that everything was smooth sailing for me, but there were mountains to climb and chasms to cross. Somehow I found a way through, and as a result we were able to create these products.

Deciding which products to make is the same as deciding how to live your life. What matters most is your vision. You must have a vision, a dream, a philosophy, for the course of your future will change depending on whether or not you have a vision. You can't simply drift through life nonchalantly; the first step is to decide what you want to do with the rest of your life. Even after you've made that decision, the rest of the world is unlikely to move according to your plans.

I was a wastrel son, and I never expected my photographic hobby to become a career in cameras.

My philosophy has its roots in the code by which I lived when young. On a personal note, I'd like to speak briefly about the source of my philosophy.

I was a wastrel son with a keen interest in photography. My family had a soy sauce manufacturing business in Shikoku. There was a Leica IIIf in the house, which I took out and used without asking. From the second half of my middle school years and all through high school, I could think of nothing else but photography. One of my school teachers introduced me to a photography club, which I joined. There were only six of us, a group of wastrel sons. We had five Leica IIIf cameras and one Rolleiflex. At that time a Leica IIIf cost about 190,000 yen, while the average monthly salary for a government employee in those days was around 7,000 yen. Though we were all wastrel sons, we had advanced skills, and at least one of us was mentioned each month in camera magazines. We used 100mm lenses to take long-distance shots and 28mm lenses for extreme close-up photography. We even won prizes!

Though I loved photography, I had no intention of making it my career. It was difficult and demanding work, and I doubted whether I could make a living through photography, so I considered other careers. I saw photography as nothing more than a hobby that I could enjoy. There were no precision engineering courses at Waseda University, where I was studying, so I chose automotive engineering. I did basic research into engines, specifically what are now known as turbo-engines. It should have been plain sailing, but I spent all my time taking photographs and wondering if I was on the right track. It was at that time that Eiichi Sakurai, creator of the first Olympus camera, happened to discover a camera patent that I had filed while still at school. "Come and work for us," he insisted. In those days a student who refused to work for the first company to offer him a job was regarded as a disgrace to his university. I had received a job offer from an automobile manufacturer, but I pretended that I hadn't and so went to work for Olympus instead.

How did my great love of photography lead to a career in camera design? What prompted me was the fact that the Leica IIIf was far from being a good all-round camera. It was not suitable for photographing flowers. Though the Leica was good for a certain range of photography, it was certainly not an all-round camera. When I found a type of subject that I couldn't shoot, I started to search for a camera that I could use. And when I couldn't find one, I decided that the only solution was to build one myself. However, the Leica was too expensive to play with, so I bought six or seven old-style micro-cameras and began to modify them.

After two years of practical training in the factory, I begin to design cameras.

Even after joining Olympus, my goal was still to take photographs. It was also fun to polish cameras and look at them. My most basic motivation was my desire to take good photographs. If I could find a camera that helped me to get the perfect shot, I would buy it, and if I couldn't, I'd make it. Years later I realized that my decision to join Olympus was the right choice for someone like me!

In my early days with Olympus, I must have seemed very conceited for someone who had only just joined the company. Because I'd won prizes, I saw myself as a professional, but as a camera designer I was a complete amateur. More experienced people looked at my drawings and just groaned. I had drawn blueprints at university, but I didn't really know how difficult it was.

They sent me to the factory for two years of practical training. During that time I was rotated to different areas of the factory every six months, and after two years I returned to the design department. However, my senior colleagues were all too busy to spend time looking after this new employee who had just been sent back to work with them, so they decided to give me difficult tasks that I could study by myself. "Try designing something," they told me.

After thinking about the work in my own way, I became aware of a problem. At that time the cheapest Olympus camera cost around 23,000 yen, but that was

one and a half months' salary for a new employee. Cameras were too expensive. I decided to create a camera that would cost no more than half a month's salary, which in my case meant 6,000 yen. My supervisors supported this idea. Even today, when camera prices are discounted everywhere, something offered at half-price would be viewed with suspicion - people would worry that there was something wrong with it. So what would people think if we reduced the price to one-quarter? Surely that would seem impossible. My supervisors agreed to go ahead with my 6,000 yen idea. I had put my head on the line.

Our efforts to emulate the photographic quality and lens performance of the Leica led to the creation of the D-Zuiko.

I always used my Leica for photographs to submit to photo contests. Yet, I was curious to see how well the camera I designed can take pictures. I took many pictures with the camera, and compared the results with the ones I took with the Leica. Perhaps it was because I was more relaxed when using the camera that I'd designed, and more strained to take a good picture with the Leica, there were lots of good photos taken by the camera of my design. After processing and enlarging shots taken with the Leica and with the camera that I'd designed, I would be angry when the images from my own camera weren't as sharply focused as those from the Leica. I wanted the quality of the photographs to be at least equal.

I wanted to emulate the Tessar type lens in the Leica camera. Because a half-size camera has a small image plane, enlargement ratios need to be proportionately greater, which obviously puts greater demands on the lens. We needed to create a lens as good as the Leica's Tessar type lens.

Olympus already had its own lens design department at this time, so I sought their assistance. I told them I needed a lens of the best quality, one that would be equal to the Leica's Tessar type lens. The person in charge of lens design told me that this was the first time he had received such a request. He said that they were usually asked to cut costs by a certain amount, or to create the best possible lens within a certain price range. I had said nothing about the price. I simply asked them to make a lens as good as the Leica lens. The lens designers were delighted to take up this challenge, and the result was the legendary D-Zuiko. They created a really wonderful lens for me.

However, there was no way that a 6,000 yen camera could compete with a 200,000 yen Leica. I'd spent so much on the lens that there was no money left. My supervisors were concerned about the cost of the lens, but no-one blamed me. After all, it was a training project, and while they sympathized, they didn't really care what happened! We had created the ideal lens, but we couldn't spend any more money on the camera.

After breaking through the technology barrier, you run into the barrier of accepted wisdom.

Leica's new M3 had a film advance mechanism operated by a lever instead of a knob. The frame counter would automatically revert to zero when you opened the cover. Today this seems obvious, but back then the mechanism was leading-edge. The rewind mechanism was also lever-operated. In fact the M3 was packed with new technology, including a bright frame range finder with a range that changed according to the lens you were using. Other camera manufacturers were desperately trying to catch up with the Leica M3.

Human ingenuity is truly amazing. Olympus was also trying to improve its film advance mechanism. However, switching to a lever mechanism would have required replacing about 40 components. We couldn't afford the expense, so we opted for a rear-winding film advance system that had a similar feel to Leica's lever system. Our system consisted of a single plastic dial. One solution would require 50 changes, the other just one. And because the part was made of plastic, it was cheap. We abandoned the idea of a frame counter that would automatically revert to zero when the cover was opened.

During my training in the factory, I learned that frame counter mechanisms are quite complex. Sometimes they would wind forward two frames instead of one, while other times the film did not advance at all. The mechanism contained about 30 parts, and there were checks at each of the 36 manufacturing stages. Over and over again, Olympus invested huge amounts of money. There was a 36-tooth gear wheel, and above that a 35-tooth pressed gear wheel. These went round one tooth at a time, and because one wheel had 36 teeth and the other 35, there was a one-unit discrepancy. With pressed gears, you don't need to exert a lot of force. The cost is only 2 yen or thereabouts, and no testing is needed, since there can be no errors once the teeth have been processed. Anyway, because we had spent so much on the lens, we had to apply a lot of ingenuity to the other parts.

The Pen was gradually taking shape, but as we moved closer to our initial goal of creating a cheap camera, we encountered two barriers. The first was the technology barrier, the same barrier I hit when I wanted to photograph something but couldn't find a suitable camera. If something doesn't exist, there must be a reason. Perhaps it would be extremely expensive or technically impossible. Or maybe it couldn't be made sufficiently compact. If you want to meet these challenges, you have to break through the technology barrier. That's the first barrier.

Olympus Pen

I'm happy to report that we were somehow able to break through the technology barrier. Because I was a new designer working on a research problem, nobody complained, and I was able to design according to my ideas. Eventually I built a prototype. When Mr. Sakurai saw it, he immediately said "Let's manufacture it." It's very unusual to look at the result of a new employee's training project and decide there and then to manufacture it. But Olympus has a culture in which people are able to act boldly. This same spirit of creativity allowed us to create cameras that could take photographs inside people's stomachs. That's why I like Olympus. You can be free of that endless process of debate about whether something will sell and how much it will cost.

So my prototype was about to go into production, and I was excited. But even though the decision to produce my camera had come from the very top, the factory manager refused to manufacture my "toy camera." Half-size cameras didn't exist then, and sales executives told us that my camera wouldn't sell because there was no market for it. This was the second barrier. Accepted wisdom told us that the camera couldn't be made and wouldn't sell. Since our factory wouldn't make it, we decided to outsource production. That was how the Pen first came into being. And as soon as it went on sale, it became a best-seller.

The Olympus Pen goes onto the market, and I see one in use

In those days camera manufacturers measured their output in hundreds of units per month, with the average being 200 or 300. Olympus had a hit product called the Olympus Wide, and we were wondering if production would hit 1,000 units per month. Once we got past the 1,000 mark, we could use conveyor belts.

I was allowed to attend and speak at the planning meeting held when the Olympus Pen went into production. Someone asked me how many I expected to sell. Statistics had just been published showing that there were 7 million cameras in all of Japan, including those tucked away in the bottoms of drawers. I thought that half the number, say 3 million, would be replaced by half-sized cameras, and that Olympus could capture half of that market, so I replied that we could sell 1.5 million units. Everyone was astonished and laughed out loud. Eventually we decided on a monthly production figure of 5,000, which was unprecedented. But the Pen sold so quickly that production couldn't keep up with demand, and soon sales staff were demanding to know when we could send more stock.

Olympus Pen S

When we developed the Pen S, we priced it at 7,000 yen. The factory manager who had refused to produce the Pen now begged to be allowed to make this camera. I felt that I had at last earned recognition within the company, and that I had finally broken through the barrier of accepted wisdom. This was due in part to the support of my superiors, who were able to see beyond the barrier, but another factor was the support of the countless users who bought the camera after it was released.

In those days, almost all camera buyers were men: men accounted for about 98% of the market, and women around 2%. Men like machines. They dream of Harley-Davidsons. That's why we made cameras with so many controls. The accepted wisdom was that real cameras had to have lots of controls.

However, a month after Olympus launched the Pen, I happened to see a mother photographing her little boy while I was on my way to work. She was using a Pen. I was so excited to see someone using the camera that I'd designed. But after I watched her for a few seconds I started to worry. I wanted to warn her that the picture would be out of focus with those settings.

It was then that I decided to design a camera that a woman like that would use. There would be no difficult controls. It would be so simple that the user would just have to push a single button. Yet this concept was the exact opposite of the cameras that were selling well on the market. The sales staff told me that it wouldn't be a proper camera, and I later heard that a conference of branch managers had also concluded that my design would not be a real camera. The head of the sales division came to see me in person and tried to persuade me to abandon the idea. I'd only been with Olympus for about three years, and it was only a year since I'd returned to the design department after my training in the factory. I was just a youngster. And yet this executive came to see me. He sat down with me and begged me to give up my idea. I impudently countered each of his arguments, and we continued to argue from morning until the end of the day. However, a junior employee cannot expect to win an argument with a division chief.

I realized that the barrier of accepted wisdom was about to prevent my idea from becoming reality, so I asked him to wait until the next day, when the prototype would be ready. I worked all through that night, and the next day I showed him the camera. He played with it in silence for about 30 minutes. Finally he looked at me and said, "Maitani, let's do it!" As the proverb says, a wise man will change his opinion, a fool never. I was filled with admiration, and wondered if I would have been able to change my mind like that if our roles had been reversed. It's not easy. And so we decided to manufacture the new camera.

The Pen was a huge best-seller, and was a major hit with women.

At the final planning session, I proposed a price of 8,000 yen. The sales people said that the price should be 10,000 yen. I had been involved in the design of many cameras, but never before had the sales people wanted to set the price higher than the figure suggested by the developers. That rarely happens. Ultimately the new camera went on sale at 10,000 yen, and it became a huge best-seller.

Once we had broken through the barrier of accepted wisdom and created the product, it immediately became a best-seller. Half the people in the world are women, and I'm sure that even some of the younger people here have seen Pen cameras in their homes. According to the data, the percentage of female

buyers jumped from 2 percent to 33 percent after the launch of the Pen EE.

Olympus Pen EE

This Camera Museum was originally founded as the Japan Camera and Optical Instruments Inspection and Testing Institute (JCII). A JCII official repeatedly told us that our new product was not a real camera, and that we should abandon the project! You might think that it's been plain sailing for me, but I've always been an unpopular member of the Olympus organization!

Companies, married couples, parents and children experience a variety of changes in their lives. It's our philosophy and passion that carry us through these changes. Whenever we try to do something new, we invariably encounter the barriers of technology and the accepted wisdom. The Pen camera resulted from our efforts to break through these barriers. I was lucky when we were developing the Pen series. I was lucky to have superiors who could see beyond the barriers, and even more lucky to have the support of users. It was this good fortune that propelled me through the second barrier.

Initially there were no plans to create a series of cameras. We just focused on developing a single model that would emulate some of the characteristics of the Leica. I never spoke about developing a series, but I was thinking about it. I also thought that the Pen would never become popular unless we developed it as a series. Ideally all of the products in a series should be launched at the same time, but this was not possible because I was doing all of the design work. When a new model is launched, the old model usually disappears. With the Pen, even when we brought out new models, the old models never went away. Each model had its own role as part of the series. Other manufacturers rushed to create their own series of half-size cameras - that was the great half-size boom.

However, manufacturers thought that users would want a 35mm, an SLR, as their main camera, and half-size cameras were seen as sub-cameras. At first I never thought of making a half-size SLR camera, but after the boom began, users began to demand half-size SLRs.

I began to develop a new shutter in response to the market demand for a half-size SLR camera.

In the mid-1950s, there was no television in the house where I lived, and so I used to spend my evenings reading novels. In those quiet moments, I began to reflect on the half-size boom, and to wonder if people would want a half-size SLR camera.

It wasn't simply a matter of halving the design of a normal 35mm camera. A 35mm camera is wide. The mirror swings up around its long axis, so it's the short side that rises. Of course, it would be disastrous if the mirror hit the lens. Today, retrofocus lenses are commonplace. With a half-size camera, everything is cut in half, so the mirror has to rotate around its short axis. This means that there is greater risk that the mirror will hit the lens. We couldn't allow the long side of the mirror to swivel up, so we created the first SLR camera with a mirror that swiveled sideways. But this created a new problem, since light going to the side no longer reached the eye. While I was thinking about this at home, I came up with the idea of directing the sideways light upwards.

The next challenge was the shutter. Flipping the mirror horizontally also lengthened it horizontally, and now it was hitting the shutter. This wouldn't work. Finally I decided to use a rotary focal plane shutter. The concept was so unusual that I was often asked if the camera had a focal plane shutter. Working on puzzles like this is a much more interesting after-dinner activity than reading a mystery novel!

Anyway, I thought that if I could develop a focal plane shutter, I could create an SLR camera, even though it would be longer horizontally. I assembled the ideas I had developed to break through the technology barrier and took them into my office, where I put them in my desk drawer. We were still extremely busy with the design and manufacture of the Pen.

Some time after the Pen became a major hit, Mr. Sakurai, the head of design, told me that people were asking for an SLR camera and asked me for my thoughts. I took the drawings that I had produced while working on the Pen out of my drawer and immediately showed them to my manager. At first he was surprised, because the camera was a different shape from a conventional SLR. I explained each of the features to him, and eventually he told me to go ahead.

It occurred to me then that if you wait until someone gives you an order to start work on a project, you lose around half a year. But if you exercise your mind all the time when you're busy, ideas will come into your head, and they will lead you to something new.

Developing the Pen F - the only half-size SLR camera

With the Pen selling so well, I no longer faced the barrier of accepted wisdom in my work. Instead I was told to make new cameras more quickly. However, the technology barrier was still there. I couldn't handle the design work alone any more, and for the first time I was given an assistant. My assistant was the leading theoretician in the development department, and he said that he wanted to begin by making a rotary shutter. What he created had all the basic characteristics of a rotary shutter, which consists of a rotating disk. It looked great, and I decided to leave the project to my junior colleague. Unfortunately it did not go as planned: each rotation took about one-fiftieth of a second. We tried in vain to make it go faster, for an SLR camera with a top shutter speed of one-sixtieth of a second was unthinkable.

We concluded that the only way to increase the speed of the shutter was to reduce the weight. Apertures and shutters are made of thin steel sheet. The steel is about six hundredths of a millimeter thick, which makes it too heavy to rotate any faster, so we tried using aluminum, which is lighter than steel. We found that the connection between the shaft and the vanes was not durable enough, so we increased the number of fasteners. Once we had securely fastened the vanes at one end, they started to break at the other end. The shutter would rotate, but the sudden force applied when it stopped caused a massive shock. The aluminum sheet crumpled like a fan. This was hopeless, so we decided to look for other light materials. The next substance that we tried was titanium, which was being used by NASA. Titanium was very rare at that time, and the purchasing department desperately searched for a source. Eventually they found a supplier somewhere in Yokosuka. We only needed a minute quantity for our prototype, but the supplier refused to sell the titanium piecemeal, and so we were forced to buy an entire roll. It was extremely expensive, but fortunately we were able to use it later, otherwise we would have incurred a huge loss.

Olympus Pen F

By using titanium, we were able to increase the speed to one three-hundredth of a second. But it still wasn't fast enough, so we made the titanium even thinner, but it crumpled like a fan. Then we remembered a technology used in microscope manufacturing, whereby the glass is etched away in the center leaving it thick at the circumference. When we etched the titanium in the same way, we were able to increase the speed almost to one five-hundredth of a second. But even this was not fast enough. The only solution now was to strengthen the spring. That enabled us to achieve a speed of one five-hundredth of a second initially, but the spring would break after a few repetitions. When we examined the affected parts under a microscope, we saw that even though the spring was made of ordinary steel, it looked like a rough piece of rope that had been pulled apart. It was metal fatigue.

Eventually we solved the problem by using a special spring made of Swedish steel. We had reached the 500 mark, but we still had to find a way to accommodate slower speeds. Today we can do this with computers, but back then we had to use mechanical gears. The shutter membrane must be held in the fully open position, which puts the gears under a tremendous strain. They told me that the mechanism just stopped. In fact the gears had been totally stripped; half the teeth had been broken off. We overcame each of these problems in turn, and eventually we were somehow able to build our focal plane shutter.

And that is how we developed the Pen F. We had created the world's first and only SLR camera. Unfortunately it was a huge failure. Because we took all the patents, no other company could manufacture this type of camera, and there was no boom.

This completes the first half of my presentation. I thought that I was challenging the two barriers with my own vision, but in fact I was simply working within the Olympus color.

Text prepared by the Olympus Web Strategy Group